

Patent claims

1 1. A method of making a solid propellant for rocket
2 drives from cryogenic monergole systems cooled below room
3 temperature and especially a heterogeneous liquid-solid propellant
4 in which at least one of the reactants is an oxidizer or fuel which
5 contains liquid or gas phase at standard temperature, for example,
6 emulsions of liquid components which are not soluble in one
7 another, suspensions of solid components in liquid components or
8 liquid impregnated bulk materials or packings, characterized in
9 that at least one liquid or gaseous phase as a reactant in the form
10 of a fuel or oxidizer is incorporated in a solid phase in a
11 structure containing hollow spaces and with a complementary
12 reactant and the liquid or gaseous phase is transformed by freezing
13 into the cryogenic solid phase below standard temperature within
14 the solid structure.

1 2. The method according to claim 1 characterized in that
2 as the solid structure an open pore foam and especially a foam of
3 plastic and/or metal foam, for example a polyethylene foam, a
4 polyurethane foam, a HTBP foam, a GAP foam, an aluminum foam, a
5 magnesium foam or a beryllium foam is used.

1 3. The method according to claim 2 characterized in that
2 as the solid structure a packing which is incorporated in a casting

3 material and is composed of a polyethylene, polyurethane, HTPB,
4 GAP, AP, aluminum, magnesium or beryllium or other mixtures is
5 used.

1 4. The method according to claims 1 to 3 characterized
2 in that the liquid phase is incorporated in the solid structure by
3 immersion and/or impregnation thereof.

1 5. The method according to claim 1 characterized in that
2 as the liquid or gaseous phase, oxygen, hydrocarbons, hydrogen
3 peroxide or an HEDM propellant is used.

1 6. The method according to claim 1 characterized in that
2 the solid structure is produced by freezing liquid fuel or
3 oxidizer, especially oxygen, hydrocarbons, hydrogen peroxide or an
4 HEDM propellant.

1 7. The method according to claims 1 and 6 characterized
2 in that the liquid phase is initially encapsulated, then mixed with
3 the solid structure and bonded with the binder.

1 8. The method according to claims 1 and 6 characterized
2 in that the liquid phase is encapsulated and before freezing the
3 solid structure is mixed with it and both then frozen together.

1 9. The method according to one of the preceding claims
2 characterized in that the combustion speed is adjusted by the
3 selection of a special hollow space size in the solid structure.

1 10. A solid propellant for rocket drives cooled below
2 room temperature, especially a heterogeneous quasi-mechanical fuel-
3 oxidizer combination in which at least one of the reactants is a
4 liquid or gaseous phase at standard temperature, for example, an
5 emulsion of liquid components which are not soluble in one another,
6 a suspension of a solid component in a liquid component or a liquid
7 impregnated packing, characterized in that at least one of the
8 reactants is contained in a stable state by cooling to form a solid
9 and at least one of the reactants is a solid phase which is
10 coherent and combined with the other via a pore structure.

1 11. The solid propellant according to claim 10
2 characterized in that the solid phase is comprised of a plastic
3 foam, especially PUR, PE, HTPB or GAP foam, a metal foam for
4 example aluminum, magnesium or beryllium or a mixture thereof.

1 12. The solid propellant according to claim 10
2 characterized in that the solid phase is comprised of a stable
3 solid.

1 13. The solid propellant according to claim 10
2 characterized in that the solid is comprised of a substance which
3 is transformed by cooling into the stable state and from oxygen,
4 hydrocarbons, hydrogen peroxide or an HEDM propellant.

1 14. The solid propellant according to one of the
2 preceding claims 10 to 13 characterized in that the solid phase is
3 comprised of a packing of optionally shaped individual pieces whose
4 hollow spaces are connected together and in which a frozen liquid
5 is contained as a reactant.

1 15. The solid propellant according to claim 14
2 characterized in that the frozen reactant is not in homogeneous
3 form but itself is a packing which is mixed into the hollow space
4 of the first packing.

1 16. The propellant according to one of the preceding
2 claims 10 to 15 characterized in that the solid phase is provided
3 with a protecting coating which chemically insulates the two
4 reactants from one another.